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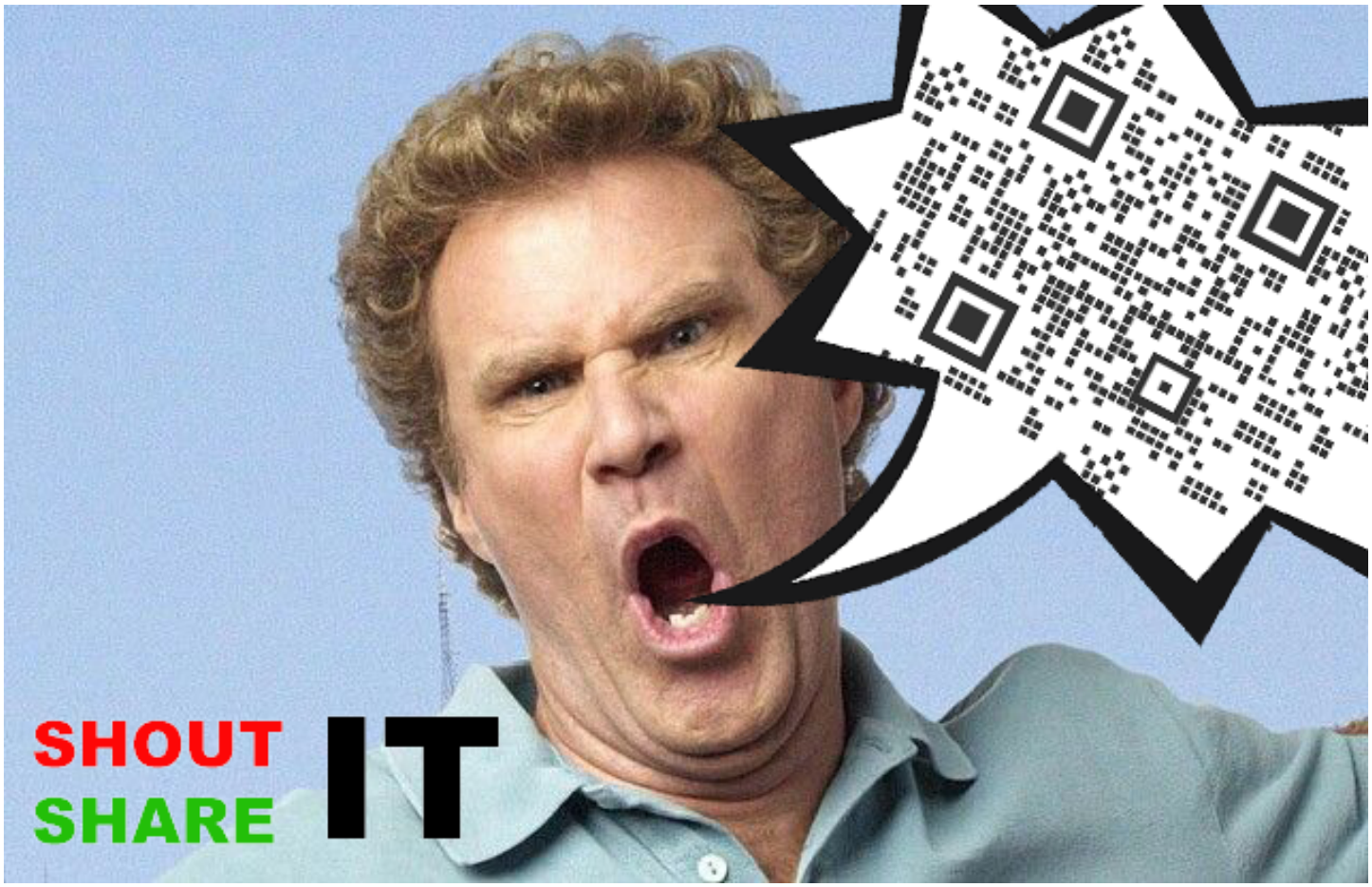
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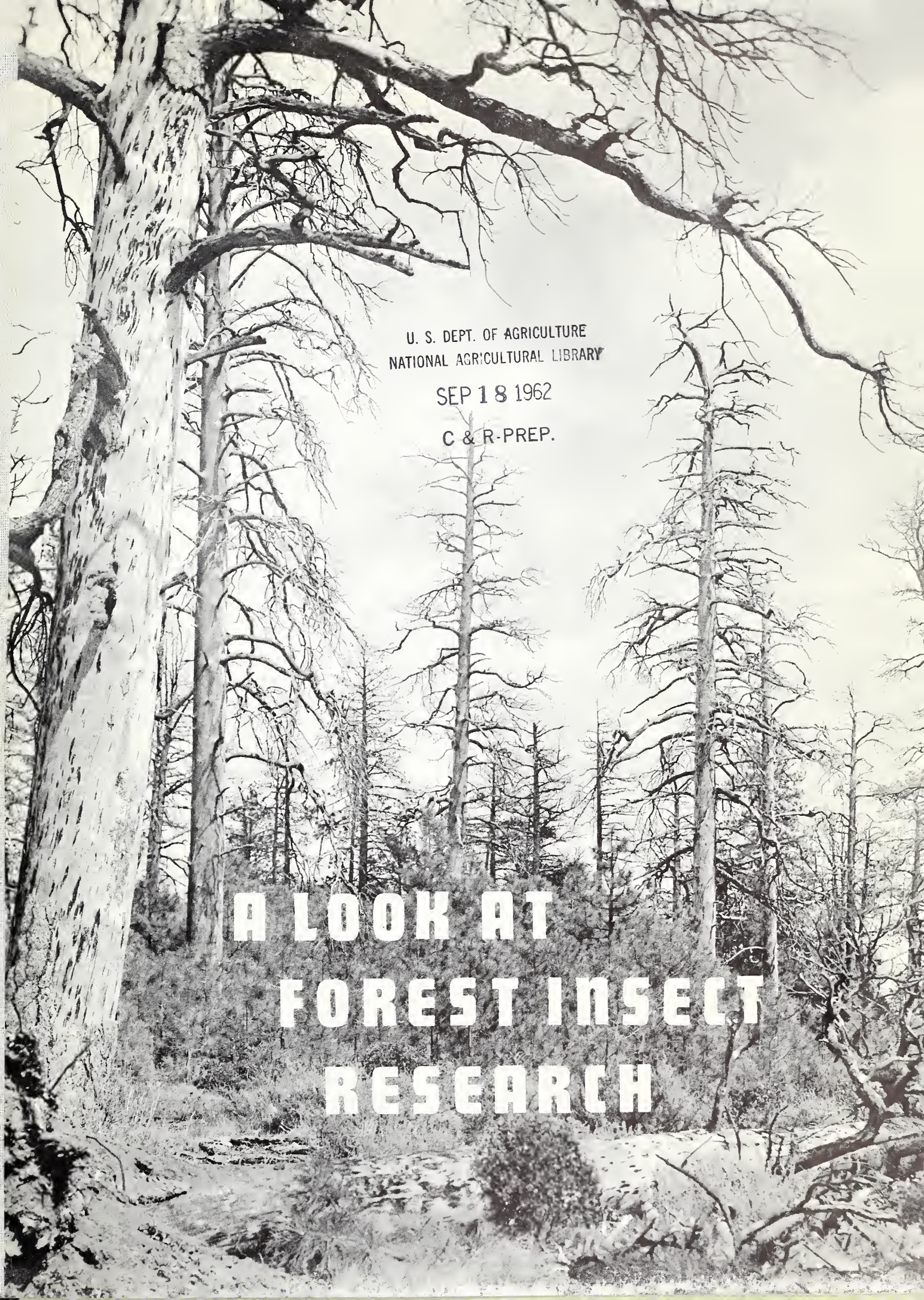

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A LOOK AT FOREST INSECT RESEARCH

Young ponderosa pine deformed by spruce budworm.

THE PROBLEM

Insects destroy enough timber in the United States each year to build over a million houses.

Forest owners wage a constant battle to keep the insect population within reasonable bounds. With knowledge gained by experience and research, they can take precautions such as depriving bark beetles and wood borers of breeding places by cutting out susceptible or infested trees or by cleaning out stored logs and the debris left by logging. But despite such care, sometimes insect populations increase suddenly and threaten to lay waste a whole forest. When this happens, emergency measures must be taken.

DIRECT CONTROL

For example, a few years ago the spruce budworm began to take a heavy toll of the forests of the Pacific Northwest. On a cost-

Drifting insecticide from this low-flying plane destroys billions of tree-killing insects.

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sharing basis, the U.S. Forest Service, State agencies, and private landowners joined forces to protect their lands. Airplanes, loaded with DDT insecticide, sprayed millions of acres of infested trees. The dramatic success of this operation justified the cost in both dollars and slight loss of fish and wildlife.

In 1960 another insect, the European pine shoot moth, appeared on ornamental trees and shrubs in the State of Washington. Because control of this insect is so difficult, the Northwest Forest Pest Action Council recommended a crash program to eradicate it before it could invade nearby pine forests. Nurserymen and homeowners cooperated, and crews began the monumental task of hunting out and killing every insect. Using the only known control method, crews fumigated infested trees with the deadly methyl bromide gas. The work is not finished, but the insect has thus far been confined to the cities.

Dead larva of European pine shoot moth lies amid ruin it created.

Fumigation chamber encloses infested tree. Crew member checks time and temperature requirements with control center.

Pacific silver fir gouted by balsam woolly aphid.

This shipping box brought 10, 0

Balsam woolly aphid infestation on bark of subalpine fir tree.

BIOLOGICAL CONTROL

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Control of the aphids was difficult. Beca e t on the bottom sides of limbs, in bark crevices, tc. reach them. Hand spraying was effective but w a ure, logging infested, dead, and dying trees wa re problems because most of the affected trees we i access roads, and mills can presently use only li forest products.

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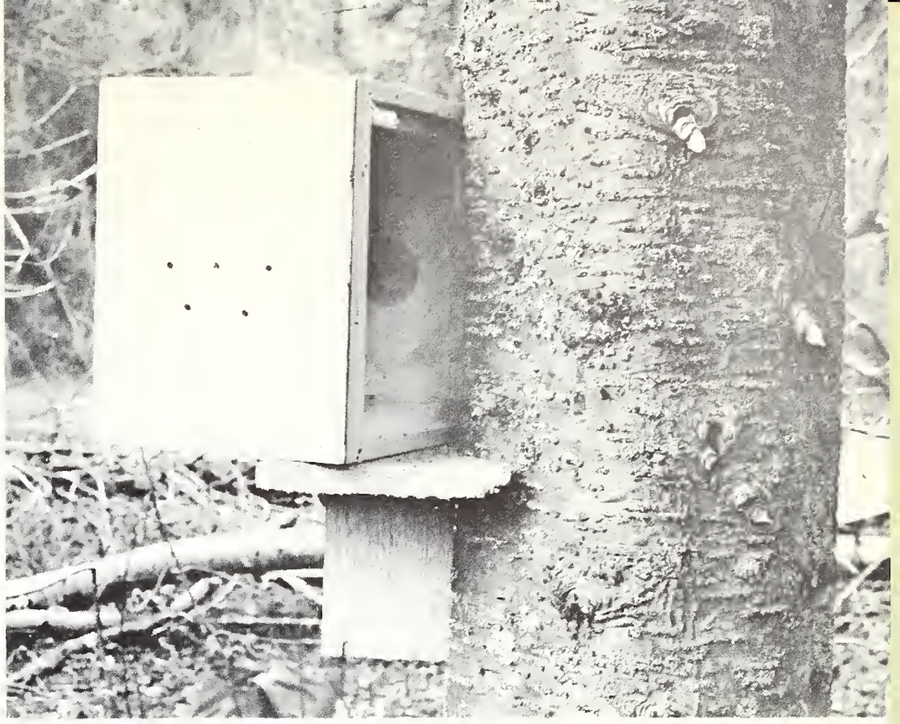

Predatory insects are released on infested subalpine fir.

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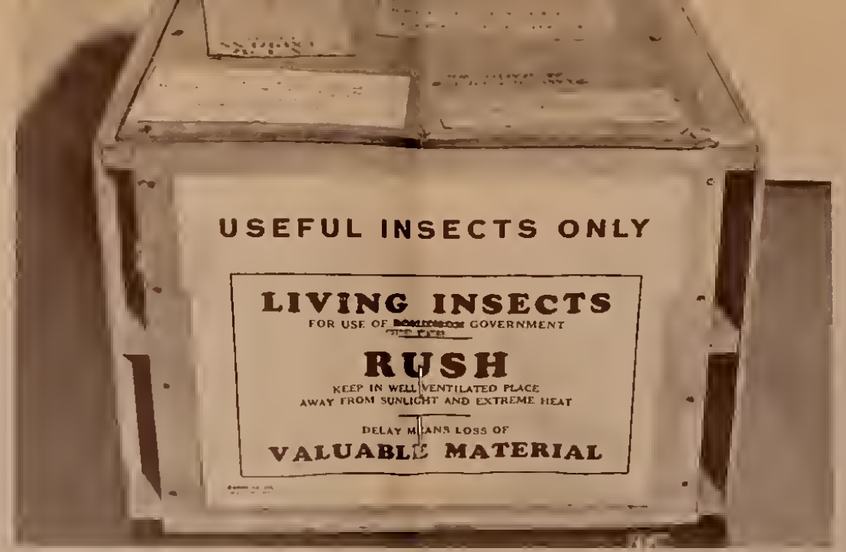
Laricobius erichsonii adult feeding on balsam woolly aphid.

Pacific silver fir gouted by balsam woolly apbid.



Tbis shipping box brought 10,000 predatory insects from Europe.

Predatory insects are released on infested subalpine fir.

Balsam woolly aphid infestation on bark of subalpine fir tree.

BIOLOGICAL CONTROL

An important facet of the research program is to develop ways of helping nature achieve a proper balance of beneficial and harmful insects so that our forests will remain healthy and productive.

In 1954, a European insect, the balsam woolly aphid, was found to be causing serious damage to true fir trees in the Pacific Northwest. How it came to the United States is not known, but its existence was first recorded in Maine in 1908. Twenty years later it was found in the San Francisco Bay area, and shortly after 1930, it was discovered in the Willamette Valley of Oregon.

Control of the aphids was difficult. Because they live in protected places--under lichens, on the bottom sides of limbs, in bark crevices, etc. --insecticides spread by airplanes could not reach them. Hand spraying was effective but was a long and costly job. As an emergency measure, logging infested, dead, and dying trees was recommended. But this, too, presented problems because most of the affected trees were in high-elevation areas not reached by timber access roads, and mills can presently use only a limited amount of true fir in the manufacture of forest products.

Meanwhile, research has concentrated on finding other means of control. Out of the investigations came the program, initiated in 1957, of importing beneficial insects to prey on the aphids. From Australia, Czechoslavakia, Sweden, India, Pakistan, Japan, and Germany came flies and beetles to reduce the aphid numbers. Some were released directly in the forests, while others were kept in the laboratory for rearing and propagation. Of the 18 species of predatory insects imported since 1957, 4 have become established. One beetle, Laricobius erichsonii,

Laricobius erichsonii adult feeding on balsam woolly apbid.

Adult parasite laying egg in body of spruce budworm larva hidden in twig scar.

Larva of parasite in typical feeding position on spruce budworm larva.

Full-grown parasite larva kills its host.

is especially successful. Studies at Willamette Pass, Oregon, reveal that this predator has become so abundant that it is eating as many aphids as are being produced--an encouraging step towards true control.

Also, parasites and insect diseases are allies in the control of damaging insects, and they have become the objects of intensive research.

In one study, spruce budworms are being mass-produced and reared in the research laboratory so that their life cycles, habits, and reactions to such factors as parasitism and disease may be analyzed.

Parasites are known to be helpful agents in keeping spruce budworm populations low. But why are their activities less effective on budworms infesting white fir than those on Douglas-fir trees?

While keeping watch on the trend of the spruce budworm population, entomologists noted that some of the larvae were apparently suffering from a disease. Laboratory examination at first indicated that it was a granulosis virus, but electron microscope examinations did not verify this diagnosis. The disease is contagious, however, and often fatal; but still many larvae recover and produce normal adults. What is this disease? Could it be a potential weapon? Researchers must find the answer.

THE FUTURE

There are many more harmful insects than those mentioned here. Each is destructive in its own way. Some are foliage eaters, some suck life-giving juices from tender shoots, some feed upon the cambium layer under the bark, some bore holes into the wood or attack the cones and seeds. All must be controlled, and all will require special procedures of control. All present challenges for the researcher.

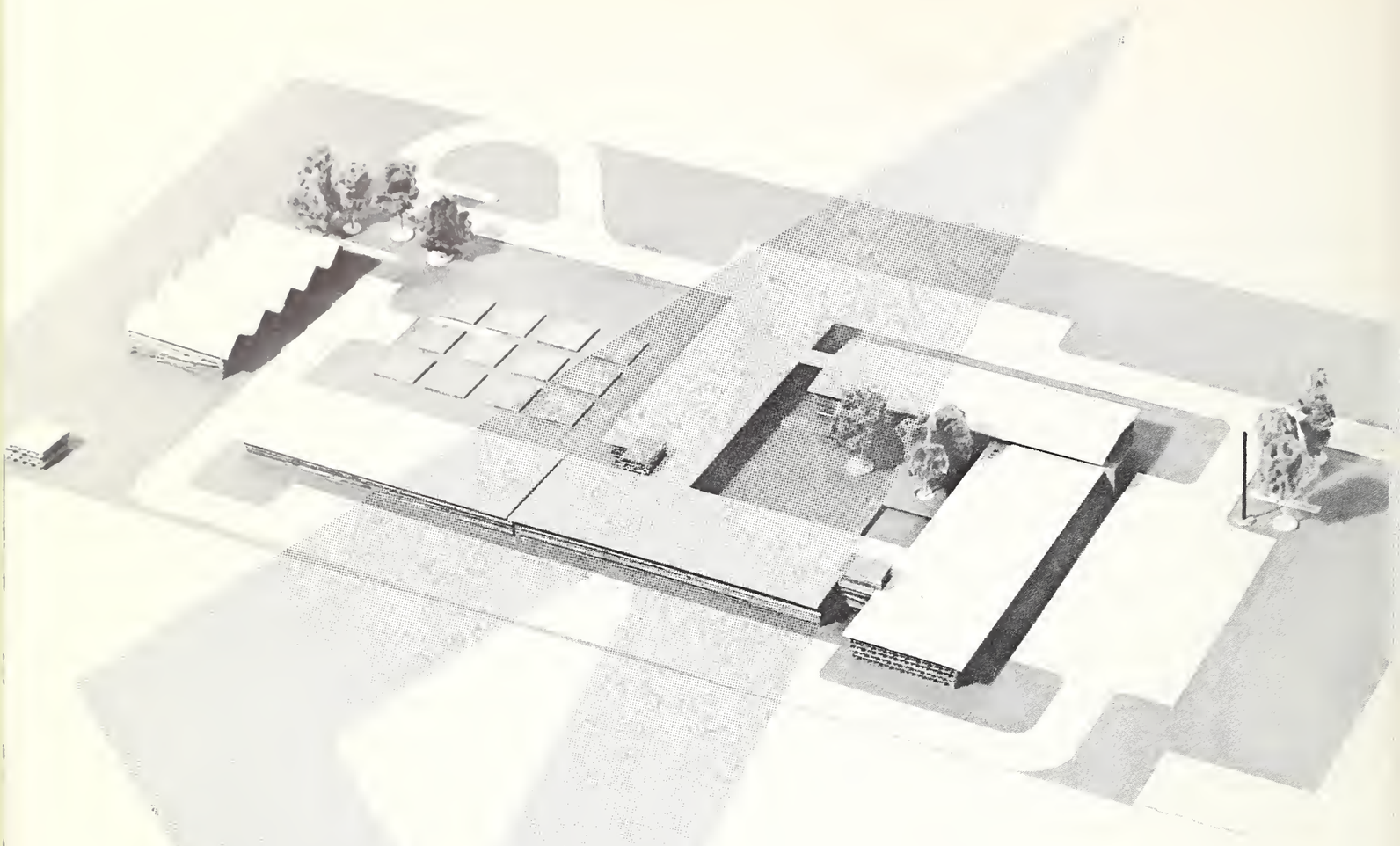
Insects may have a relation to the diseases of trees or vice versa, and there is a possibility that forest genetics research can develop strains of trees strong enough to resist the ravages of both.

Research into these problems has been carried on for many years in the Pacific Northwest by State and Federal agencies and by schools and private organizations. As knowledge increases, the needs of researchers increase for adequate equipment and facilities in order to maintain the pace set by the demand for more and more information.

For the Pacific Northwest Forest and Range Experiment Station, a long-felt need is being fulfilled by the construction of a new research laboratory on the Oregon State University campus. It is designed not only for solution of problems already mentioned but for others plaguing the forest manager as well, such as those involving improvement of forest stands, protection against forest tree diseases, and watershed management.

Insects being reared at research laboratory are closely watched.

Electron microscope at laboratory allows study of insect virus diseases.



Architect's model of new Forest Service laboratory at Corvallis, Oregon, soon to be ready for occupancy.

PACIFIC NORTHWEST

FOREST AND RANGE EXPERIMENT STATION

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June 1962